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The Heavy Photon Search experiment at Jefferson Lab¹

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The Heavy Photon Search (HPS) experiment in Hall-B of Jefferson Lab is searching for a new heavy vector boson that is a well motivated and viable force particle, which could mediate interactions with hidden-sector dark matter. It is designed to search for heavy photons in the mass range between 15 MeV and 500 MeV and the coupling to electrons that is $\epsilon e > 10^{-10}e$, through their decay to e^-e^+ pairs. A precision tracking/vertexing detector allows searching for heavy photons using both resonance-search and secondary vertex strategies. In 2015 and 2016, HPS collected its first engineering data with 1.05 and 2.3 GeV beam energies respectively, which allowed us to understand and characterize the detector performance and to develop analysis techniques for both resonance-search and vertex searches. These analyses led to detector upgrades, which have improved HPS's physics reach by adding an additional layer to the tracking detector and adding a scintillation hodoscope to the trigger. The first physics run of HPS, which incorporates these two upgrades, started in June of 2019, and finished early in September of 2019. In this talk, the upgraded detector and its expected reach will be discussed together with published and preliminary results from the engineering runs.

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